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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/552,932	04/20/2000	Ralph C. Taylor	0100.0000770	5713

7590 04/02/2003

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EXAMINER
NGUYEN, KIMBINH T

ART UNIT	PAPER NUMBER
2671	5

DATE MAILED: 04/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/552,932	TAYLOR ET AL.	
	Examiner	Art Unit	
	Kimbinh T. Nguyen	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 July 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This action is responsive to amendment filed 7/17/02.

2. Claims 1-30 are pending in the application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 6-8, 21-23 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al. 5,720,019) in view of Fowler et al. (6,052,129).

Claim 1, Koss et al. discloses comparing the X coordinates for the vertex with X clip values to determine an X clip code, wherein the X clip values correspond to the minimum and maximum X values to include a horizontal discard clip guard band (fig. 4); comparing the Y coordinates with Y clip values to determine a Y clip code, wherein the Y clip values correspond to the minimum and maximum Y values to include a vertical discard clip guard band (col. 11, lines 17-26; figs. 3-10); comparing the Z coordinates with Z clip values to determine a Z clip code, wherein the Z clip values correspond to minimum and maximum Z values (fig. 7; col. 13, lines 53-61; col. 15, lines 27-32); determining if the primitive can be discarded (the portions of clipped objects which fall outside of the view volume) based on the X clip code, the Y clip code, and the Z clip

code (col. 14, lines 19-20; col. 16, lines 5-10); it is noted that Koss performs comparators between the vertex input data: x, y, z coordinates that define the primitives received into corresponding screen space coordinates and the corresponding objects R,G,B color values for each pixel coordinate corresponding to the minimum and maximum values to generate clip codes which determine either trivially rejected or trivially accepted (figs. 3-11); however, Koss fails to teach discard clip guard bands for clipping processing; however, Fowler et al. teaches primitive clip testing using trivial analysis (rejecting (discard) or acceptance), the guar band boundaries (left, right, bottom and top), determining whether a triangle can be trivially rejected or trivially accepted; in case the trivial rejected or discard, the discard clip guard band is introduced (figs. 9 and 10); when the primitive can be discarded (clipped objects which fall outside of the view volume), discarding the primitive (col. 2, lines 3-5); and when the primitive cannot be discarded (the portion inside of the view volume), processing at least a portion of the primitive using a three-dimensional graphics pipeline (by the rasterizer) (col. 2, lines 5-6). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Fowler's teaching into the Koss' method for utilizing the clip guard band to perform primitive clipping, because generating the clipcodes by comparison to the boundaries of the clip volume and the guardband clipping plane, it would reduce the number of clipping operations, increase the number of trivial accepts and rejects, and having high performance primitive clipping preprocessing (col. 6, lines 10-11).

Claim 2, 3, 6-8, Koss et al. discloses rasterizing at least a portion (pixel) of the primitive (col. 1, lines 46-52); Koss does not teach clip guard band; however, Fowler et al. discloses the discard clip guard bands are based on a dimension of a rasterized area of the primitive (triangle) (col. 6, lines 7-20); the horizontal (z coordinate) and vertical (y coordinate) discard clip guard bands correspond to an amount of dimensional (guard band w value) expansion (infinitely large) used for processing primitives (pixels) (col. 8, lines 20-23); the dimensional expansion corresponds to anti aliasing operations performed on primitives having at least three vertices (triangle) (col. 6, line 28); the horizontal and vertical clip guard bands (fig. 9) correspond to dimensions corresponding to a predetermined number of pixels (pre-clipping clip code computation step) (col. 8, lines 20-26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Fowler's teaching into the Koss' method for utilization of guard band region about the periphery of the clip volume, because it would reduced the number of clipping operations (col. 6, lines 10-11).

Claim 21, the rationale provide in the rejection of claim 1 is incorporated here in. In addition, Koss et al. discloses a processing module (graphic processing circuit); and memory operably coupled to the processing module (vertex data input) (see abstract).

Claims 22, 23 and 26-28, the rationale provided in the rejection of claims 2, 6, 7 and 8 is incorporated here in.

5. Claims 4, 5, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al. 5,720,019) in view of Fowler et al. (6,052,129) and further in view of Callahan et al. (5,012,433).

Claim 4, Koss does not teach primitive dimension; however, Callahan et al. discloses the primitive is a line and the dimension is ones half of a smaller dimension (actual viewing volume is smaller than a clipping volume or window) of the rasterized area of the line (col. 7, lines 8-25). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Callahan's teaching into the Koss' method for enlarging the viewing volume (window) boundary, because it would improve transformation a line primitive to allow the wide line to be accurately and effectively rendered in the real viewport (col. 7, lines 49-51).

Claim 5, Koss et al. discloses various techniques have been developed for clipping having geometry primitive is a triangle (three vertices), a line (two vertices), a point (one vertex), but Koss does not teach a radial dimension of the rasterized area of the point; however, Callahan teaches multistage clipping on simpler representations of primitives (e.g. a line or a position and a radius for a circle) (col. 5, lines 8-32). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Callahan's teaching into the Koss' method for analyzing geometry primitive, because when the primitive's size is a rendering attribute, the function used to obtain the clipping volume boundaries must take into account the zoom effects of the mapping process, since the point responds to zooming to obtain a radial circle (full

circle) within the clipping window, this would improve multistage clipping method (col. 7, lines 44-45).

Claims 24 and 25, the rationale provide in the rejection of claims 4 and 5 is incorporated here in.

6. Claims 9, 10, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al. 5,720,019) in view of Fowler et al. (6,052,129) and further in view of Hartog et al. (5,369,741) and Morse et al. (6,359,630).

Claim 9, Hartog et al. discloses (within the clipping scissor register 38) comparing the X coordinates with trivial-accept X clip values (LEFTX) to determine a trivial-accept X clip code (outcode CO or outcode C1), wherein the trivial-accept X clip values correspond to the minimum (LEFTX) and maximum X values (RIGHTX) for the display space scaled to include a horizontal accept clip guard band (boundary X); comparing the Y coordinates with trivial-accept Y clip values (TOPY) to determine a trivial-accept Y clip code, wherein the trivial-accept Y clip values correspond to the minimum (TOPY) and maximum Y values (BOTTOMY) for the display space scaled to include a vertical accept clip guard band (boundary Y). Hartog does not teach z clip code; however, Koss teaches z clip code (see the rejection of claim 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Hartog's teaching into the Koss' method for determining trivial-accept clip code, because it would provide a method for preclipping lines based on the relationship of the endpoints of clipping areas (col. 2, lines 46-48); Hartog also discloses when the primitive cannot be discarded (each line are saved) based on comparison with

the X clip code, the Y clip code, and the Z clip code, determining if the primitive is to be processed in its entirety based on the trivial-accept X clip code, the trivial-accept Y clip code, and the Z clip code (col. 8, lines 25-38); Hartog does not disclose processing the primitive using 3d graphics pipeline; however, Morse et al. discloses when the primitive is to be processed in its entirety (col. 11, lines 35-36), processing the primitive using the three-dimensional graphics pipeline (col. 9, lines 44-48); when the primitive is not to be processed in its entirety: clipping the primitive to produce a clipped primitive; and processing the clipped primitive using the three-dimensional graphics pipeline (col. 2, lines 21-22; col. 4, line 53 through col. 5, line 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Morse's teaching into the Koss and Hartog teachings for utilizing 3D graphics pipeline, because it would improve method of clipping testing using one clip register per vertex and using multiple processing units (col. 2, lines 40-42).

Claim 10, Morse et al. discloses the vertical accept clip guard band (guard band clipping boundary 314; fig. 4) is greater than the vertical discard guard band (regular clipping clipping boundary 312; fig. 4), and wherein the horizontal accept clip guard band is greater than the horizontal discard guard band (col. 11, lines 33-41). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Morse's teaching into the Koss' method for utilizing the guard band, because using guard band it would flexibility may advantageously increase the simplicity and speed of the system and method of improved clip testing (col. 14, lines 58-60).

Claims 29 and 30, the rationale provided in the rejection of claims 9 and 10 are incorporated here in.

7. Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al. 5,720,019) in view of Murphy (6,111,584).

Claim 11, Koss et al. discloses a clip code generator (clipping processor) that is operable to receive a clip-space primitive (coordinates for each vertex of a primitive to be clipped), wherein the clip code generator compares (clip compare register) coordinates for vertices of the clip-space primitive with screen space coordinates scaled by a discard clip guard band (clip region) to determine discard clip code (trivially rejected) for the clip-space primitive (col. 11, lines 61-66; col. 13, line 44 through col. 14, line 20; col. 15, lines 26-27); an evaluation block operably (the clipping preprocessor) coupled to the clip code generator (clipping processor), wherein the evaluation block evaluates the discard clip codes to produce a discard decision included in control information, wherein the discard decision indicates whether the clip-space primitive can be discarded primitive (col. 2, lines 17-21); a clip processing block operably coupled to the evaluation block and operable to receive the clip-space primitive, wherein when the discard decision included in the control information indicates that the clip-space primitive can be discarded, the clip processing block discards the clip-space primitive, wherein when the clip-space primitive cannot be discarded, the clip processing block selectively performs clipping functions on the clip-space primitive based on the control information to produce a clipped primitive (col. 15, lines 6-20); and a three-dimensional graphics pipeline operably coupled to the clip processing block (fig. 1, processor 19

coupled to front end board 10, texture mapping board 12 and frame buffer 14 each is pipelined and operates on multiple simultaneously) (col. 4, lines 63-65); Koss does not teach pixel fragment data; however, Murphy discloses the three-dimensional graphics pipeline processes the clipped primitive to produce pixel fragment data (col. 4, lines 37-44). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Murphy's teaching into Koss' method for utilizing pipelined processing, because fragment is the portion of a primitive which affects a single pixel, fragment will be eliminated in the pipeline, this would support trivially rejected or accepted to improve rendering a primitive using the primitive data (col. 83, lines 20-21).

Claim 12, 13, Murphy discloses a frame buffer operably coupled to the three-dimensional graphics pipeline, wherein the frame buffers stores pixel data (RGB, Alpha) corresponding to the screen space, wherein the three-dimensional graphics pipeline blends the pixel fragment data with the pixel data (col. 32, lines 55-67; col. 33, lines 35-37); the three-dimensional graphics pipeline includes a rasterization block, wherein processing the clipped primitive includes rasterizing the clipped primitive (col. 32, lines 56-67; col. 37, lines 12-13). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify feature pixel fragment blending of Murphy's teaching into primitive clipping method as taught by Koss, because it would improve rendering a primitive (col. 83, lines 20-21).

Claim 14, Koss et al. discloses a transform block operably (clip code bus) coupled to the clip code generator and the clip processing block, wherein the transform

block is operable to receive an object-space primitive, wherein the transform block transforms the object-space primitive from object space to clip space to produce the clip-space primitive (col. 2, lines 46-51; col. 12, lines 30-32).

Claim 15, Koss et al. discloses the clip code generator (clipping processor) compares the coordinates for the vertices(col. 9, lines 17-37) with clip space coordinates of frustum clip planes (view volume) scaled by an accept clip guard band to determine accept clip codes for the clip-space primitive; wherein the evaluation block evaluates the accept clip codes to produce an accept decision include in the control information, wherein the accept decision indicates if the clip-space primitive is to be processed without clipping; and wherein when the accept decision indicates that the clip-space primitive is to be processed without clipping, the clip processing block forwards the clip-space primitive as the clipped primitive without clipping the clip-space primitive (col. 13, lines 21-43).

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al. 5,720,019) in view of Murphy (6,111,584) and further in view of Morse et al. (6,359,630).

Claim 16, Morse discloses the accept clip guard band (guard band clipping boundary 314; fig. 4) is greater than the discard clip guard band (regular clipping boundary 312; fig. 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Morse's teaching into the Koss' method for utilizing the clip guard band, because using guard band it would improve clip testing

refers to the operation of determining whether a geometric primitive is to be clipped or not clipped for the purpose of reducing number of primitives which are rendered.

9. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al. 5,720,019) in view of Murphy (6,111,584) and further in view of Fowler et al. (6,052,129).

Claim 17, Fowler et al. discloses the discard clip guard bands are based on a dimension of a rasterized area of the primitive (triangle) (col. 6, lines 7-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Fowler's teaching into the Koss' method for rasterizing primitive, because using of guard band requires that the rasterizer can handle vertex coordinates that fall outside of the actual clip region (trivial reject) and it would reduce the number of clipping operations (col. 6, lines 10-12).

Claims 18 and 19, the rationale provided in the rejection of claims 4 and 5 are applicable hereto.

Claim 20, the rationale provided in the rejection of claim 8 is incorporated here in.

Response to Arguments

10. Applicant's arguments filed 7/17/02 have been fully considered but they are not persuasive.

With respect to Applicant's arguments, claim 1, Koss teaches almost limitations of the claimed invention (figs 3-10) for performing clipping the polygons, except the discard clip guard band; however, Fowler modified this feature in his invention by

introducing the clip guard band region, trivial analysis is used to perform clipping in both cases trivial rejecting and trivial acceptance (fig. 6); this concept of guard band would apply into the Koss' system for clipping preprocessing which includes the clip extents minimum x value, a maximum x value, a minimum y value, a maximum y value, a minimum z value, a maximum z value (col. 11, lines 17-26); in the case of a trivial rejection, all of the vertices of primitive must be found outside of the clip region, it is a discard clip guard band region (because there are two sets of outcodes, one for the clip region, and one for the guard band region). It is noted that Koss and Fowler perform trivial analysis for both trivial rejecting (discarding) and trivial acceptance (see Koss at col. 12, lines 24-26; col. 13, line 62 through col. 14, line 20; see Fowler at col. 8, lines 5-6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Fowler's teaching into the Koss' method for utilizing the guard band region into the clipping preprocessing to produce the discard clip guard band for three-dimensional coordinates (x, y and z coordinates), because the number of polygons requiring clipping is effectively reduced by the introduction and utilization of a guard band region about the periphery of the clip volume, thereby optimizing the graphics processing flow to the point at which clipping is conducted (Fowler, col. 4, lines 27-33). The rejection of claim 1 is proper. Independent claims 11 and 21 correspond to the rejection of claim 1.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Kimbinh Nguyen** whose telephone number is **(703) 305-9683**. The examiner can normally be reached **(Monday- Thursday from 7:00 AM to 4:30 PM and alternate Fridays from 7:00 AM to 3:30 PM)**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Part II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Kimbinh Nguyen

March 26, 2003

MARK ZIMMERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600